

## Research Assistant in Multi-Hazards Modelling for Earthquakes and Tsunamis

(Ref no: ACAD01051)



### FURTHER PARTICULARS

#### JOB DESCRIPTION

<b>Department:</b>	Civil Engineering	<b>*Progressable role:</b>	No
<b>School / Address:</b>	Queen's School of Engineering, Queen's Building, University Walk, Bristol BS8 1TR	<b>Contract Type:</b>	+Fixed-term contract for 33 months
<b>Academic Faculty:</b>	Faculty of Engineering	<b>Work pattern:</b>	Full-time
<b>Grade:</b>	I		
<b>Academic Career Pathway:</b>	Two		
<b>Profile Level:</b>	a		
<b>Salary:</b>	£31342 - £35256		

+ Appointment may be either on a fixed term or a open-ended contract depending on the extent of previous relevant research experience, in line with the University's Fixed Term Contract Agreement. Further information can be found at [www.bristol.ac.uk/hr/ftc/](http://www.bristol.ac.uk/hr/ftc/)

#### Main Job Purpose:

CRUST (Cascading Risk and Uncertainty assessment of earthquake Shaking and Tsunami) is an EPSRC funded project. In this project, cascading hazards due to mega-thrust subduction earthquakes are modelled by developing a novel methodology for multi-hazards risk assessment from a holistic standpoint. One of the key features of the CRUST project is a coherent treatment of risk and uncertainty related to compounding risks due to mainshock ground shaking, massive tsunami, and prolific aftershocks acting on coastal infrastructure. Dr Katsu Goda (Civil Engineering, University of Bristol) is the PI of the CRUST project. The project is conducted in close collaboration with Prof Tiziana Rossetto (EPICentre, University College of London [UCL]) and UCL researchers.

As part of the CRUST project, one full-time Post-Doctoral Research Assistant (PDRA) position is available for the maximum of 3 years (the funding starts 1 October 2014 and ends 30 September 2017). Dr Goda acts as a project supervisor. The main purposes of the funded position are to:

- Conduct research related to the CRUST project,
- Deliver research outcomes for the CRUST project, and
- Support research activities related to the CRUST project

#### Statements of Responsibilities:

The main responsibilities for the PDRA position are to conduct research and to support research activities related to the CRUST project.

#### Research

The PDRA will conduct research related to the CRUST project. The work packages (WPs) of the CRUST project that is relevant to the advertised position include:

- WP1-1: Strong motion simulation of mega-thrust subduction earthquakes
- WP1-2: Spatiotemporal modelling of aftershock occurrence using global earthquake catalogue data
- WP1-3: Earthquake risk modelling due to mainshock and aftershock sequences
- WP2-1: Tsunami simulation and uncertainty/sensitivity analysis

- WP3-1: Multi-hazards framework for strong shaking and tsunami using the 2011 Tohoku data
- WP3-2: Development of a simple engineering tool for structures under shaking and tsunami loads
- WP4: Case studies for other subduction zones (e.g. Hikurangi zone in New Zealand and Cascadia zone in Canada)

One of the major tasks for the PDRA position is to develop a comprehensive cascading multi-hazards framework for strong motion and tsunami. Therefore, among the above-mentioned WPs, the PDRA should be able to take independent leadership for integrating the two hazards into a holistic risk framework (WP3-1) and for developing a practical engineering tool (WP3-2). Other tasks (WP1 and WP4) will be conducted in collaboration with Dr Goda as well as UCL researchers. The WPs with which the PDRA is involved will be decided by taking into account PDRA's research interests and experiences.

### Administration

The PDRA will be responsible for supporting research activities related to the CRUST project. The administrative responsibilities include: (i) organisation of and contribution to international workshops to be held in London, Tokyo, Vancouver, and Wellington, (ii) organisation of and preparations for the CRUST advisory meetings, and (iii) collaboration with UCL researchers and with academic/industrial partners of the CRUST project.

## PERSON SPECIFICATION

The qualifications, skills, knowledge and experience outlined below provide a summary of what is required to carry out this job effectively. They also form the selection criteria on which the decision on who to appoint will be made. Please ensure that you show how you meet the criteria outlined below in your application.

### Relevant Experience, Skills and Knowledge

#### Essential

- Strong background in either strong motion modelling or tsunami modelling
- Strong background in structural dynamics

#### Desirable

- Strong background in risk analysis, probability & statistics, and reliability theory

### Relevant Qualifications

#### Essential

- PhD in earthquake engineering, tsunami hazard modelling, or (more broadly) structural engineering with particular interests in natural hazard/risk assessments
- A record of recent publications in peer-reviewed journals or comparable outlets or presentations to industrial conferences and/or seminar and/or publications

#### Desirable

- Work experience in industry

### Communication and Interpersonal Skills

#### Essential

- Good writing skills for reports and publications
- Excellent personal organization and self-directed learning skills

#### Desirable

## Additional Criteria

### Essential

- Commitment to the job
- Passion for research
- Inspired, curiosity-led approach for research
- Full-time over the duration of the project

### Desirable

## BACKGROUND INFORMATION

### The CRUST Project

The research objectives of CRUST are fivefold: (1) to develop an integrated multi-hazards impact assessment methodology for cascading earthquake-related phenomena (i.e. mainshock followed by tsunami and multiple aftershocks); (2) to characterise earthquake slips for future mega-thrust earthquakes as random field, and to evaluate the impact of uncertain slips on strong motion and tsunami simulations; (3) to model a sequence of mainshock-aftershock earthquake records based on actual observations, and to assess their combined effects on nonlinear structural response; (4) to model off-shore tsunami generation and propagation, to characterise tsunami fragility based on numerical simulations, and to validate these with a unique set of experimental data and field observations for the 2011 Tohoku earthquake and tsunami; and (5) to develop practice-oriented engineering guidelines and tools for multi-hazards impact assessment, and to demonstrate their capabilities by applying them to other subduction zones, such as the Hikurangi (New Zealand) and Cascadia (Canada) zones.

The main deliverables of the project are: (i) development of a generic modelling framework for cascading hazards; (ii) development of guidelines for multi-hazards modelling; (iii) development and validation of computational tools for practical application of the methodology; and (iv) applications of the methodology and tools to different subduction zones in a future prediction mode.

### The University and the City of Bristol

The University of Bristol's roots date back to 1876. Since its formation it has become one of the leading institutions among the UK's Russell Group of universities and operates globally, where it is recognised for its research and academic excellence.

The University has a strong interdisciplinary approach and regularly features among the top ranking institutions in global league tables.

The University of Bristol's mission is '*to pursue and share knowledge and understanding, both for their own sake and to help individuals and society fulfil their potential*'. This is underpinned by a vision where the University of Bristol is an international powerhouse of learning, discovery and enterprise, whose excellence is acknowledged locally, nationally and globally, and that is:

- dedicated to academic achievement across a broad range of disciplines, and to continuous innovation and improvement
- research-intensive, supporting both individual scholarship and interdisciplinary or thematic research of the highest quality
- a centre for intellectually demanding, research-informed education that nurtures independence of mind and helps students achieve their personal goals and serve society's needs, both during and after their time here
- an inclusive and collaborative community of scholarship that attracts and retains people with outstanding talent and potential from all walks of life and all parts of the world

- a stimulating and supportive environment for all students and staff, distinguished by a commitment to high standards, respect for the individual and a strong sense of collegiality
- committed to operating in a sustainable manner
- engaged with society's interests, concerns, priorities and aspirations
- a major contributor culturally, environmentally and economically to Bristol and the South West
- well led and responsibly run, with an emphasis on consultative decision-making and open communication as well as personal responsibility and accountability

Key to Bristol's vision is a clear and consistent articulation of and dialogue with its many stakeholder and publics about the wide range of research carried out at the Institution and hence is often featured in many national and international media. It has a proud history of two way dialogue as part of its research activities and addresses the world's key challenges through an interdisciplinary approach.

The University also plays a lead role in the city of Bristol's cultural and economic well being and carries out an extensive programme of events and activities on behalf of the city, as well as being a keen supporter of partner organisations' activities.

For more information, please see <http://www.bris.ac.uk/university/>

### **The Faculty of Engineering**

The [Faculty of Engineering](#) currently has about 125 members of academic staff, 100 contract research staff, 120 administrative and technical staff and around 1500 undergraduate and 600 postgraduate students. The Faculty is comprised of two schools; the Merchant Venturers' School of Engineering (encompassing the Departments of Computer Science, Electrical & Electronic Engineering and Engineering Mathematics) and the Queen's School of Engineering (including the Departments of Aerospace Engineering, Civil Engineering and Mechanical Engineering).

The Faculty receives over 5000 applications for postgraduate and undergraduate programmes each year from both home and overseas applicants and seeks to recruit and train the best engineers of the future from around the world. The Faculty offers a diverse range of programmes at undergraduate and postgraduate level across the schools, including a number of successful taught masters courses - this is an area the Faculty is particularly looking to develop. Collectively the faculty delivers 28 undergraduate programmes, 15 PGT/MSc Programmes, and a PhD programme in each department.

The Faculty has strong links with local industry, as well as Government departments and research establishments. The Faculty boasts University Technology Centre agreements for example with Rolls-Royce, AgustaWestland Helicopters, Vestas Wind Systems and Toshiba. These links have been an important element in the success of the Faculty in obtaining support for its research. Contract research support is now around £16m per annum, nearly all of which has some form of industrial linkage. The Faculty also has increasing international links, and has had a strong presence in EC research programmes for many years.

The Faculty has a particularly outward facing profile and the Dean will play a major role in promoting communications and relationships between the faculty and external organisations as well as fostering relationships internally within the University.

The Dean also has a vital University-wide leadership role, participating in the formulation of University academic strategy and policy, through membership of the University Planning and Resources Committee and Senate.

## **The Queen's School of Engineering**

Undergraduate degree programmes in the Queen's School of Engineering are arranged within the separate Departments of Aerospace, Civil and Mechanical Engineering, along with the interdisciplinary programme in Engineering Design. Our MEng undergraduates pursue professionally accredited specialised engineering programmes. They are also encouraged to study wider management, entrepreneurial and societal issues and to engage in original research and design activity. This combination of breadth and depth makes our graduates highly sought after by employers.

World-leading research contributes directly to all of the activities of the School, from the undergraduate degree curricula through a range of MSc and Doctoral Training programmes, to an extensive portfolio of Industrial Collaborations. Research is organised into school-wide research groups - see the Faculty Research Homepage – which include: Dynamics and Control, encompassing structural and nonlinear dynamics, aerodynamics, robust control, earthquake engineering, soil mechanics and the BLADE experimental testing facilities; Composite Materials (ACCIS), including leadership of the National Composites Centre; Applied Mechanics, which involves design, structural integrity evaluation and process engineering, including the Nuclear Research Centre; Systems Engineering, including the collaborative Systems Centre; Water and Environmental Engineering, with links to the University's Cabot Institute) and Robotics, including the collaborative Bristol Robotics Laboratory.

Major strategic industrial partnerships exist with companies such as Rolls-Royce, AgustaWestland Helicopters, Airbus, GE Aviation, EdF Energy and Vestas.

## **The Department of Civil Engineering**

Civil Engineering is one of six departments in the Faculty of Engineering.

There is a long history of civil engineering within the University and past professors include such well-known people as Hele-Shaw – one of the originators of experimental fluid mechanics; Pippard – who introduced strain energy methods into Britain; Baker – renowned for his leading work in modern approaches to design of steel structures; and Pugsley – for his pioneering work in the field of risk and structural safety and design of suspension bridges.

The Department is one of the top civil engineering departments in the country and this is reflected across a range of quality indicators. We were awarded 22 points out of a maximum of 24 in the most recent Teaching Quality Assessment (TQA) by independent inspectors from HEFCE. The Department is also recognised as internationally excellent in its research activities through the RAE2008 Research Assessment Exercise with 80% of our research falling within this category. The Department also consistently appears at or near the top of national surveys and league tables. The Department focuses on first-class undergraduate teaching and world-class research.

Our purpose is to help civil engineers make a difference because civil engineering touches the lives of everyone and has an intimate relationship with our natural environment.

## **The University's Positive Working Environment**

The University's Positive Working Environment (PWE) agenda is an ongoing process with the aim of making working life at the University of Bristol productive, rewarding, enjoyable and healthy for all colleagues. PWE describes the things we believe are important as an employer, and a series of actions to help us deliver them.

As an employee of the University, you will have access to a range of benefits which includes, amongst others:

- **For staff with families, those planning to have families, and those with other caring responsibilities**, the Work and Family Steering group, providing a combination of information, training and support; maternity/paternity coaching service, The University's Early Years Nursery and a childcare voucher scheme. For more information on work and family please visit: <http://www.bristol.ac.uk/equalityanddiversity/workandfamily>
- **Professional training and support** including an extensive programme of training & development courses, focus on work-life balance, tailored leadership and management workshops, flexible working policies, support groups such as the Women's Research Group, careers guidance and a team of International Staff Advisers;
- **For health, fitness and wellbeing**, our Staff Wellness Programme, Staff Counselling Service, Staff Club, and staff member rates for the Sports Centres and the Swimming Pool;
- **Travel to work benefits** including interest-free bicycle loans, free cycle training and priority car parking spaces for car sharers, parents and carers, and a University bus shuttle.

To find out more about PWE please visit <http://www.bristol.ac.uk/pwe/>

### CAREER PATHWAY INFORMATION

As part of the process of modernising its pay and grading systems, the University has introduced career pathways for academic staff. What this means is that all members of academic staff have a clear career pathway involving a series of levels with distinct role profiles, each with its unique requirements. Each profile sets out what is expected of an academic at the particular level. The role profiles also set out a collection of competencies expected for each level. Progression or promotion to the next level will occur after these competencies have been attained and where a role at the higher level is available.

### APPLICATION PROCESS

Please visit our web site at [www.bris.ac.uk/jobs](http://www.bris.ac.uk/jobs), enter the vacancy number ACAD101051 into the job search and follow the link to the on line application process.

Further information on the University's application process can be found at: <http://www.bristol.ac.uk/jobs/application-process.html>

Women are under-represented in this area and we would welcome applications from female candidates.

We are happy to discuss the possibility of job share, or of part time or flexible working patterns. We would particularly welcome applications from those with caring responsibilities.

**Informal enquiries can be made to** Dr Katsu Goda ([katsu.goda@bristol.ac.uk](mailto:katsu.goda@bristol.ac.uk))

### SELECTION PROCESS

It is expected that interviews will be held in early October 2014.

### ADDITIONAL INFORMATION

#### **Contract Type**

The successful applicant for this vacancy may be appointed either on a fixed term or a permanent contract depending on the extent of their previous relevant research experience, in line with the University's Fixed Term Contract Agreement. Further information can be found at [www.bristol.ac.uk/hr/ftc/](http://www.bristol.ac.uk/hr/ftc/)

# Academic Staff Career Pathways

Profile Level

e

d

c

b

a

Pathway One

Pathway Two

Pathway Three

Professor  
1e

Professorial  
Research  
Fellow  
2e

Professorial  
Teaching  
Fellow  
3e

Senior  
Lecturer  
1d1

Reader  
1d2

Senior  
Research  
Fellow  
2d1

Reader  
in  
Research  
2d2

Senior  
Teaching  
Fellow  
3d1

Reader  
in  
Teaching  
& Learning  
3d2

Lecturer  
1c

Research  
Fellow  
2c

Teaching  
Fellow  
3c

Lecturer  
1b

Research  
Associate  
2b

Teaching  
Associate  
3b

Research  
Assistant  
2a

Teaching  
Assistant  
3a

↑ Progression

↑ Progression when role available

↑ Promotion